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United States Navy

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

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The issuance of this publication approved by the Secretary of the Navy on 28 June 1961.

Bacterial Meningitis - Review of 294 Cases

J. O. Eigler, E. D. Rooke, E. J. Svien, Mayo Foundation, Rochester, Minn.
Proceedings of Staff Meetings of Mayo Clinic 36: 357-365, 19 July 1961.

The discovery and widespread use of antimicrobial drugs have caused a large decrease in the mortality rate due to bacterial meningitis. Nevertheless, in 1953, Hoyne pointed out that fatality rates for most types of this disease were not likely to be less than 30%. Smith, in 1954, reported a mortality rate of 31%, while, in 1958, Kauhtio and Rantasalo reported a similar rate of 33%. During World War II, more soldiers in the Army of the United States died as a result of meningococcic infections (meningitis and bacteremia) than of any other infectious disease. It is apparent from these statistics that bacterial meningitis is still attended with a significant mortality rate which indicates that treatment programs could be further improved.

This study represents an analysis of the records of 294 patients examined at the Mayo Clinic during the 10-year period, 1948 to 1958.

The number of patients and organisms producing meningitis are presented in Table 1. The yearly totals remained relatively constant with the

Table 1
Bacterial Meningitis by Year (1948 to 1958)

Organism	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	Total	Per cent of total
Facultative gram-negative bacilli	3	2	2	2	3	1	2	—	4	3	22	7.5
Streptococci	5	—	3	6	1	2	4	1	6	3	31	10.5
Staphylococcus aureus	2	3	1	1	1	2	5	4	—	4	23	7.8
Multiple bacteria	6	4	4	6	4	6	2	4	2	2	40	13.6
Neisseria meningitidis	2	2	3	3	4	15	1	4	1	3	38	12.9
Diplococcus pneumoniae	5	5	4	1	3	5	3	4	6	1	37	12.6
Haemophilus influenzae	1	3	3	1	5	8	10	5	4	6	46	15.7
Unknown bacteria	4	4	3	12	6	3	7	7	8	3	57	19.4
Total	28	23	23	32	27	42	34	29	31	25	294	100.0

largest incidence in 1953. Thirty-three patients with tuberculous meningitis and 12 in whom the infection was caused by fungi were not included in this report but are mentioned for comparison only.

In many instances, meningitis developed while the patient was suffering from another significant illness, such as brain tumor, congenital defect, head injury, leukemia, carcinomatosis, or similar serious condition. The authors have indicated this large group of patients by the term "underlying disease or injury." Necropsy material was available for 66 patients and was reviewed to determine the degree of infection present at death. If meningitis

was the primary cause of death, the infection was classified as "uncontrolled," even though a culture of the spinal fluid taken prior to death had been negative. When an underlying disease was present and control of the meningitis was uncertain, the term "indeterminate" was applied.

The 294 patients were divided into seven groups according to the organism isolated from the spinal fluid. An eighth group consisted of patients with the clinical diagnosis of bacterial meningitis, but in whom cultures of the spinal fluid were negative.

Cultures of the spinal fluid revealed organisms other than Neisseria meningitidis, Diplococcus pneumoniae, and Haemophilus influenzae in 116 patients. This is unique and represents the most interesting phase of this presentation. In most large series reported previously only a small number of these bacteria were encountered and rarely were they associated with meningitis. For example, Lepper and associates found only 21 organisms of this type among a total of 246 patients. The large number of patients in the study who had long-term primary illness, multiple procedures involving the central nervous system, and prolonged treatment with various antibiotics, may explain the high incidence of these uncommon organisms. Yow has emphasized the importance of Proteus and Pseudomonas as so-called secondary invaders during prolonged antibiotic therapy.

This report is also unusual in that it presents 141 cases in which meningitis occurred as a complication of an underlying disease or injury. The mortality rate in this group was 24.8% as compared with an over-all rate of 17%. It would appear that the presence of underlying disease had an adverse effect on the fatality rate. This is the result of difficulty encountered in control of the meningitis because the underlying disease may "mask" the infection by obscuring the usual clinical findings and, at the same time, produce changes in the spinal fluid similar to those occurring in meningitis. Consequently, this complication may not be detected immediately, and valuable time may elapse before the administration of specific therapy. The clinician should be alert to this possibility and should obtain cultures of the spinal fluid as soon as his suspicion is aroused. These cultures occasionally will be negative; nevertheless, this diagnostic procedure is entirely justified since it may result in the diagnosis of a so-called masked meningitis.

Furthermore, when an underlying disease was present, the illness was usually long, necessitating repeated hospitalization together with multiple diagnostic and operative procedures. Antibiotics were administered frequently during hospitalization; thus, when infection occurred, treatment was more difficult because the organism was often resistant to the antibiotics in common use.

Sometimes death intervened before adequate therapy could be administered. This occurred as a result of masked meningitis, rapidly progressive or fulminating meningitis, infection that had been present for some time before admission, and the difficulty of diagnosis in the newborn. An example of the latter was an infant in whom episodes of cyanosis were the only manifestation of meningitis during life. Today it is not uncommon to encounter patients who

have bacterial meningitis but negative cultures. In a review of 409 children, Smith found the spinal fluid cultures to be negative in 91, while in a report by Detmold, no organism could be found in 17 of 124 patients. There were 57 patients (19.4%) in this series in whom no organism could be cultured.

The authors agree with many reporting physicians concerning the fact that antibiotic therapy prior to hospital admission is one of the main reasons that negative cultures may be obtained in bacterial meningitis. Heycock has pointed out that previous partial treatment with antibiotics tends to change the classic signs and symptoms of this disease and thus obscures the diagnosis. The authors recorded a history of previous antibiotic therapy in 33 of 57 patients comprising the group with meningitis due to unknown bacteria. It is interesting to note that there were no deaths among these 33 patients, which supports the statement that early diagnosis and treatment are of utmost importance in the management of this disease. This fact has been emphasized further in many reports including one by Hsü-Ming and Tsai-Tao. To make the diagnosis early, the clinician must maintain a high degree of suspicion, and check the spinal fluid immediately when he cannot otherwise exclude meningitis.

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Pulmonary Embolectomy

Journal of the A.M.A. Editorial 177: 326, 5 August 1961.

Insidious venous thrombosis remains one of the most serious and least understood of the vascular diseases, causing disabling symptoms and, occasionally, death from pulmonary embolism. Statistical review of clinical experience with thromboembolism since the turn of the century reveals no significant trend in incidence of the disease. Moreover, the incidence of pulmonary embolism resulting from insidious venous thrombosis has remained relatively constant, although anticoagulants and other therapeutic measures have been widely used clinically for control of this complication. Thus, any method of definitive treatment of either the primary thrombosis or the secondary embolic phenomena would be welcomed by the profession.

In general, treatment of deep venous thrombosis of the calf and thigh consists of supportive measures, often in conjunction with anticoagulants. If pulmonary embolism does not ensue, the results of treatment are considered successful. Although popular more than 5 years ago, surgical ligation of the superficial femoral veins for prevention of pulmonary embolism is seldom used today.

In patients who develop pulmonary infarction, various types of venous ligations may be used. Ligation of the inferior vena cava is favored by many surgeons, particularly if involvement of pelvic veins is suspected. Unfortunately, results of such surgical methods are frequently difficult to evaluate because of the problems of diagnosis, variations in pathologic findings, and unpredictability of prognosis. Recently, introduction of fibrinolytic agents

has been heralded by some as an important adjunct in therapy of venous thrombosis because these substances supposedly have the advantage over the anticoagulants of actually dissolving the intravascular clots. An appraisal of results with fibrinolysins will await accumulation of clinical experience, but one should at least remain skeptical until a comprehensive study of patients is available.

Emergency surgical treatment for an acute massive pulmonary embolism has challenged surgeons for more than 50 years since Trendelenburg, in 1908, first proposed pulmonary embolectomy as a possible feasible maneuver. When this procedure was tried clinically, the mortality proved to be almost prohibitive. Except for an occasional successful case (in many of which the results were questionable), the Trendelenburg operation was almost entirely discarded. Advances in cardiovascular surgery during the past decade have been rapid, leading to improvement in management of both vascular and cardiac lesions. The use of temporary cardiopulmonary bypass for open-heart surgery has opened an entirely new field, permitting operation for many lesions which formerly were not surgically correctable.

Application of this technic to emergency treatment of pulmonary embolism was a logical, and perhaps inevitable, step in this steady expansion of cardiovascular surgery. Nevertheless, in the issue of The Journal of the A.M.A. 177:283, 5 August 1961, the report by Cooley, Beall, and Alexander of the first successful pulmonary embolectomy with complete recovery of the patient should be considered another milestone in cardiovascular surgery. Their method may lead to saving many similar patients who otherwise are doomed to almost certain death. Hopefully, reports of other successful cases will be forthcoming from other medical centers once the pump oxygenator is adapted for emergency resuscitative use. Patients in moribund condition may be revived in a hospital room and maintained on cardiopulmonary bypass until definitive embolectomy may be accomplished in the operating room.

Although pulmonary embolectomy during cardiopulmonary bypass will be performed only rarely compared to the frequency of pulmonary embolism, the method proposed by Cooley deserves consideration in every case in which the embolism is not immediately fatal. This surgical achievement is symbolic of the aggressiveness of cardiovascular surgeons and offers reassurance of future improvements in treatment of thromboembolism.

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Bone in Electrolyte Metabolism. Bone seems to act as an important stabilizing factor maintaining the constancy of composition of the extracellular fluid. It has been shown to donate Na, K, Ca, and Mg to the extracellular fluid when these ions are leaving the body, and to remove Na, Ca, and Mg when they are being added to the body. In addition, bone contains a large amount of base which is available during acidosis and helps maintain a constant blood pH. (M. Reidenberg, Arch Int Med, April 1961)

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Pathologic Lesions in Experimental Hypernatremia Induced by Extracorporeal Dialysis

B. F. Rush, Laurence Finberg, G. F. Daviglus, and Che-Sun Cheung, Depts of Surgery and Pediatrics, The Johns Hopkins Hospital, Baltimore City Hospitals, and The Johns Hopkins University School of Medicine.
Surgery 50:359-366, August 1961.

Hypernatremia will be encountered in any clinical situation in which the balance of water and sodium in a patient results in a persistent gain of sodium in relation to water. This may result either from losses of water in excess of losses of sodium, or from excess of sodium intake in relation to water intake, or from a combination of these events.

While hypernatremia is not observed so commonly by the surgeon as is hyponatremia, it is not a rare electrolyte disturbance, and has been found in infants with diarrhea, in patients with heat stroke, in association with intracranial lesions, after neurosurgery, in the diuretic phase after renal failure, in uncontrolled diabetes insipidus, and during treatment of diabetes mellitus. Also, it has been described in association with gastrointestinal bleeding and with overenthusiastic feedings of high caloric-high solute diets by nasogastric tube. The mechanism which contributes to the increasing concentration of sodium in these various clinical situations differs somewhat, but the ultimate serum electrolyte pattern achieved is the same.

Hypernatremia is more often found in the very young and in the very old, or in patients with impaired renal function. In all of these instances, renal concentrating power is decreased, a more dilute urine excreted, and the tendency to accumulate sodium in excess of water is enhanced.

The clinical syndrome which accompanies hypernatremia is marked by malaise, restlessness, confusion, hallucinations, and convulsions. These symptoms have drawn attention to the central nervous system, and an increasing body of clinical and experimental data indicates that definite subdural and intracranial lesions may accompany the hypernatremic state.

Some clinical reports have suggested that renal damage also occurs, but the causal mechanism of the renal lesions observed is confused by the fact that most of the patients with these changes have been in shock for some time before death, or were the victims of overdoses of sulfonamide drugs.

Experimental studies of hypernatremia in the past have involved significant changes in the fluid volume of the subject, either by overhydration or by dehydration (and usually both, sequentially). Such volume changes have been necessarily accompanied by circulatory changes which are also seen in physiologic disturbances which do not involve hypernatremia. This has made analysis of the resultant pathologic process difficult in that some of the changes could well have been circulatory in origin. The present study had as one of its goals the inducement of hypernatremia without changing body water volume and without permitting changes in concentration of extracellular ions other than sodium and chloride.

This report describes the use of extracorporeal dialysis as an experimental tool and presents some of the results obtained. With an artificial kidney, a steady state of severe hypernatremia of approximately 200 mEq per liter was created in 8 dogs for periods of 5 to 8 hours. In 4 of these animals, body water volume was held constant. In 5 animals, by the same technic, hyperosmolality without hypernatremia was created by the use of urea. Seven animals were dialyzed on the artificial kidney against a bath of normal electrolyte composition. The last two groups of animals served as controls for the first group.

Subarachnoid and subdural hemorrhages occurred in 7 of the 8 hypernatremic dogs. These changes did not occur in the urea-treated dogs, or in the dogs dialyzed against a normal bath.

Seven of the 8 hypernatremic dogs showed changes in the renal tubular epithelium. These changes consisted of scattered areas of acute tubular necrosis in the proximal and distal tubules. Several animals demonstrated an accompanying finding of large vacuoles in the tubular cells. The glomerular capillaries showed no change. No changes were seen in the renal tubules of the control animals or the urea-treated animals.

Severe degrees of hypernatremia without accompanying circulatory disturbance can induce definite histologic damage in the cerebral and renal tissues. It would not be expected that these changes, once they occur, could be corrected by returning the electrolyte pattern to normal.

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Ulcerative Colitis

J. A. Rider MD, H. C. Moeller MD, E. J. Puletti MD, L. F. Agcaoili MD, J. O. Gibbs MD, R. G. Devereaux MD, Joyce Swader BS, and Elizabeth Stevenson BS, San Francisco, Calif. Arch Surg 83: 181-189, August 1961.

Ulcerative colitis can be an acute or chronic inflammatory disease involving the colon. Early clinical features include bloody diarrhea, abdominal cramps, anemia, fever, and weight loss.

Proctoscopic examination in patients with ulcerative colitis reveals that the mucosa is edematous, granular, friable, ulcerated, and bleeding. Application of a cotton swab to the mucosa causes a diffuse petechial hemorrhage. Blood will be seen on the cotton pledget when it is withdrawn and examined.

Roentgenologic examination of the colon reveals spasticity and increased motility, fine serrated mucosa, lack of haustra ("lead pipe" colon, as illustrated on page 10), and thickened shortened appearance of the colon. To confirm the diagnosis of ulcerative colitis, the presence of other disease processes, such as amebiasis, specific infections, and lymphopathia venereum, must be excluded. The following conditions or diseases may occur as complications of ulcerative colitis:

Pseudopolyposis
Stricture
Carcinoma
Arthritis
Toxic megacolon
Pyoderma gangrenosum
Iritis
Giant ulceration
Massive hemorrhage
Toxemia
Fistulas and perirectal abscesses
Perforation
Hepatitis, cirrhosis
Arteritis
Amyloidosis
Thrombophlebitis
Psychosis

Etiology

Although the etiology of ulcerative colitis is unknown, it is possible that hypersensitivity or mechanisms of immunity, infection, and psychogenic disturbance may be causative factors. Evidence of hypersensitivity factors in the etiology of ulcerative colitis has been obtained both from animal experiments and from tests in which human volunteers participated.

The Intramucosal Test in Human Beings. —Dilutions of egg, wheat, milk, and other food substances were injected into the rectal mucosa through an anoscope by means of a 5-inch, 24-gauge needle with an attached adjustable guard. Biopsy of the sites, where the food substances were injected and the control sites, was performed 24 hours after the injections were made.

In normal persons, the reaction to the intramucosal tests was negative; but, occasionally, a small punctate area of bleeding was seen at the site of the needle puncture. Mucosal tissue taken from the injection site 24 hours after the injection was described upon microscopic examination as indicating a nonspecific inflammatory response.

A proctoscopic view of the colon showing a negative reaction to an intramucosal test in a patient with ulcerative colitis is shown in one of the figures of this article, as is a microscopic section of such a test site. In persons with ulcerative colitis, a positive test as seen through the proctoscope was manifested by immediate erythema and engorgement of the capillaries, followed by the appearance of an edematous wheal 1 to 2 cm in diameter. Microscopic examination of mucosal tissue taken from a positive-reaction site 24 hours after the injection revealed an acute inflammatory response, acute vasculitis, edema, perivascular infiltration, and eosinophilia.
(NOTE: All of the above positive test results, as well as the first 8 of the 17 listed complications of ulcerative colitis, are excellently illustrated in color in the original article.—Editor)

Treatment

Ulcerative colitis can be controlled or arrested, or a patient cured, provided the diagnosis is made early in the course of the disease and the appropriate therapeutic measures are followed. General measures that should be taken include prescription of a bland diet, anticholinergic agents, sedatives and rest.

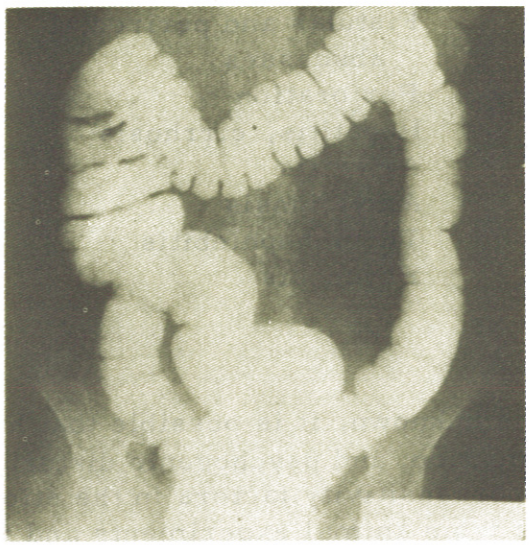

Fig. 1.—Roentgenogram of normal colon.

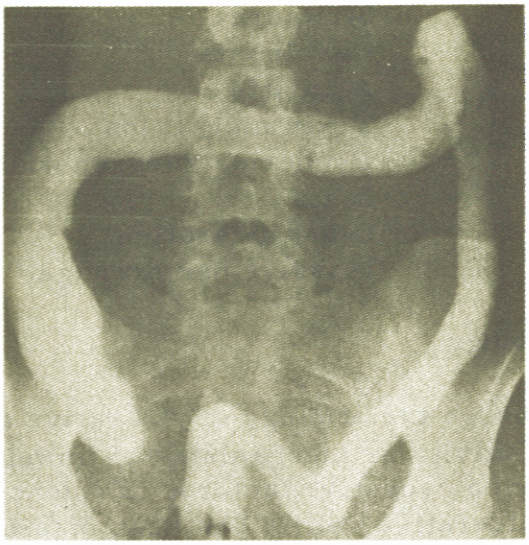

Fig. 2.—Roentgenogram of colon with evidence of ulcerative colitis.

Specific measures that should be taken in the treatment of patients with ulcerative colitis include:

1. Removal from the diet of foods to which hypersensitivity has been demonstrated.

2. Prescription of salicylazosulfapyridine (Azulfidine). Although the exact mechanism of its action is not known, experimental evidence indicates that salicylazosulfapyridine localizes in the submucosa and exerts its beneficial effect there. The usual dosage is 1 to 2 gm every 3 to 4 hours.

3. Prescription of steroids such as dexamethasone (Decadron). The anti-inflammatory action of dexamethasone is the most potent of all the glucocorticoids and its mineralocorticoid effect is very slight. Problems of electrolyte imbalance, such as excessive sodium retention and potassium excretion, are not usually associated with the administration of dexamethasone. Side effects are minimal when dexamethasone is given in therapeutic doses, and they usually disappear when its administration is discontinued.

Dosage of dexamethasone depends upon the severity and expected duration of the disease and upon the prognosis and reaction of the patient to the medication. In general, however, the following is used: (a) for systemic effect, 0.50 to 1.50 mg orally every 6 hours; (b) for local effect (when ulcerative colitis is limited to the rectal area), rectal suppositories or retention enemas containing 0.50 to 1.50 mg.

4. Prescription of water-soluble bioflavonoids. Duo-CVP, one such bioflavonoid, consists of 200 mg of water-soluble citrus bioflavonoids and 200 mg of ascorbic acid.

It has been postulated that bioflavonoids act to maintain the integrity of the capillary wall and the intercellular cement substance; they may thus prevent an increase in capillary permeability and fragility in the presence of a

disease process. It has also been postulated that the capillary system reacts more effectively to stress when aided by bioflavonoids. Water-soluble bioflavonoids, presumably acting as described above, have been found beneficial as an adjunct to the therapeutic regimen for some patients with ulcerative colitis.

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Human Skin Cell Medium

P. C. Bakken,* V. J. Evans,** W. R. Earle, ** R. E. Stevenson.* Establishment of a Strain of Human Skin Cells on Chemically Defined Medium NCTC 109, Amer J Hyg 75: 96-104, January 1961.

A strain of cells derived from adult human skin epithelium and designated NCTC strain 1769 was originally planted November 12, 1953. The strain was initially maintained on a medium of 30% pooled human serum, 20% filtered chick embryo extract, and 50% Earle's balanced saline. In May 1956, NCTC clone 2414 was established and was maintained in the same medium.

The pressing need for adequately defined tissue-culture systems for investigating host-parasite relationships, nutritional requirements, and metabolic pathways in mammalian cells has led to the attempts to grow cell cultures in chemically defined media.

To date, monkey-kidney epithelium, derivatives of Earle's strain L mouse fibroblast, and a strain of cells derived from mouse lymphoma have been converted from a protein-enriched medium to medium NCTC 109.

This paper describes the adaptation of a strain of the human skin epithelial clone to continuous growth at a rapid rate of proliferation on glass in static cultures in chemically defined medium NCTC 109. This paper also describes the successful growth of this strain in rapidly agitated fluid suspension cultures in this protein-free medium.

The first strain of human cells has been adapted to successful continuous cultivation at a rapid rate of proliferation in both static monolayer cultures and in rapidly agitated fluid suspension cultures in chemically defined medium NCTC 109. No supplements of antibiotics, serum, protein, enzymatic digests or other undefined materials were incorporated. This cell strain is designated NCTC strain 3075 and is a subline of NCTC clone 2544. The combination of factors responsible for the adaptation appears to include (a) meticulous adjustment of the ratio of cell population to volume of medium as determined by careful microscopic observations of cell appearance, (b) precise control of pH of the culture fluid, and (c) improvements in cleaning of culture glassware. Successful cultivation of this cell strain in agitated fluid suspension cultures from relatively small inoculum to large final populations at a rapid logarithmic growth rate was facilitated by modifications in the original procedure for propagating cell suspension. These modifications included (a) the incorporation of methocel in the culture medium, (b) siliconizing the wall of the culture flask, (c) continuous cultivation of the cells in a new

design culture vessel by means of which centrifugation and fluid renewals could take place directly in the culture flask. The significance of the availability of a human cell strain in medium NCTC 109 with no supplements is discussed.

* Tissue Bank, Naval Medical School, National Naval Medical Center, Bureau of Medicine and Surgery, Department of the Navy, U. S. Department of Defense, Washington, D. C.

** Tissue Culture Section, Laboratory of Biology, National Cancer Institute, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare, Bethesda, Md.

The original skin was obtained at the Tissue Bank, Naval Medical School, by a sterile postmortem excision, from a 52-year old male, dead of coronary occlusion. A prior reference gave the age as 65, but a reexamination of autopsy records provided this corrected age.

* * * * * *

Report on Surgical Observations in the Far and Middle East

Waltman Walters MD, Rear Admiral, Medical Corps, U. S. Naval Reserve (Retired), Emeritus Member, Section of Surgery, Mayo Clinic, Rochester, Minn. Proceedings of Staff Meetings of The Mayo Clinic 36: 405-408, August 2, 1961.

The following abstract is from a detailed report to appear in the Archives of Surgery. It reports observations made during a 6-1/2 month study trip to surgical clinics and hospitals in ten different countries in the Far and Middle East and two in Europe.

Studies were made on the problem of gastric cancer—so common in the Japanese—and cholangiohepatitis with bile pigment stones in the intrahepatic and extrahepatic ducts—also common among the Japanese and Hong Kong Chinese, but infrequently seen in Chinese patients in Singapore or in other Far and Middle Eastern countries and the United States. Thirty-seven hospitals were visited and ward rounds made in thirty-four. Fourteen papers were presented and several surgical conferences participated in. Although the abstract is short, it summarizes some of the most important observations.

Cancer of the stomach, peptic ulcer, and lesions of the biliary tract were studied in many Japanese hospitals on the islands of Honshu and Kyushu. Many factors are present in the heredity, food, and drinking habits of this race of people (who are very thin and eat little animal protein) which, with almost constant thermal irritation of the mucous membranes of the esophagus and stomach by hot rice, tea, and saki, may play some role in the high incidence of these lesions. It is not uncommon for Japanese men to drink 15 to 20 cups of hot green tea each day, and rice and rice patties are a large part of each meal. Insufficient vitamins also may be contributory. The number of deaths

from cancer of the stomach is high, as the incidence per 100,000 population is five times that in the United States.

Gastric ulcer is much more common than duodenal ulcer in the Japanese; bile pigment stones occur in much greater frequency in the intrahepatic and extrahepatic bile ducts than stones in the gallbladder. These are secondary to a cholangiohepatitis resulting from repeated bouts of gastroenteritis that is parasitic in origin in many cases.

Excellent surgical work was seen in all the hospitals and clinics visited, and extensive research was being done on cancer of the stomach in many universities, medical schools, and cancer institutes. Similarly, much research was being performed on lesions of the biliary tract in many Japanese clinics; indeed, research in most fields of surgery is being carried out to the advantage of patients and teaching programs.

At the U. S. Naval Hospital in Yokosuka, a fine training program has been arranged for interns and residents. Their graduate training program has been approved by several American Specialty Boards. Rotating internships have been provided at the various U. S. Armed Forces hospitals in Japan for qualified graduates of Japanese medical schools.

Because so many Hong Kong Chinese are treated by irregular practitioners using the old, so-called traditional Chinese methods, it is difficult to get reliable statistics referable to the incidence of disease except on estimates based on numbers of patients studied in outpatient departments and in hospitals. Both in Queen Mary's Hospital and Kowloon Hospital, cancer of the stomach, although appearing frequently, does not occur as often as among the Japanese. However, among the Hong Kong Chinese, there is a high incidence of esophageal cancer. Studies of cholangiohepatitis and associated bile pigment stones in the intrahepatic and common bile ducts by McFadzean, Stock, and Ong seemed to indicate that the Clonorchis sinensis infects the upper part of the intestinal tract. From the intestinal tract it is conveyed to the liver by portal blood draining the intestines; it produces cholangiohepatitis with biliary calculi and is the most prominent etiologic factor resulting in severe crisislike attacks of pain with shocklike reactions in the Hong Kong Chinese. The chronic attacks of recurring types of pain with symptoms are similar to those seen in Occidentals. Removal of stones and drainage of the biliary tract by biliary intestinal anastomosis have been effective in eliminating or reducing the attacks.

Duodenal ulcer occurs more frequently than gastric ulcer in the Hong Kong Chinese and also in the Chinese of Singapore; on the latter island, cholangiohepatitis with bile pigment ductal stones is rarely seen. In the Chinese of both Hong Kong and Singapore, esophageal cancer occurs frequently, but gastric cancer is not as frequent as in the Japanese.

Cancer of the stomach, peptic ulcer, and lesions of the biliary tract among the Vietnamese, the Thais, and the people of Northern India (New Delhi) are similar in type and incidence to those in Occidentals. Splendid surgical work was being done in hospitals connected with universities in the cities visited in these countries.

In the Persian Gulf, Shaikhdom of Bahrain malignancies of any type are exceedingly rare, as are lesions of the biliary tract. Acute appendicitis and respiratory infections are frequent. There are two government hospitals and schools with high standards on this small island. The medical care in the Government Hospital, the American Mission Hospital (Dutch Reform Church), and the Bapco Petroleum Hospital is excellent. Their medical and nursing staffs are largely composed of Britishers and Americans, but a training school for nurses has been started for native women, and several Bahrainian doctors are receiving graduate medical specialty training in the United States.

Among the Arab peoples of Egypt, Lebanon, and Syria, and in the Grecians, the incidence of cancer of the stomach does not seem disproportionately high as among the Japanese, nor does cholangiohepatitis with intraductal stones of bile pigment occur. In both conditions, the frequency and types are about the same as in American patients. This applies to gastric and duodenal ulcers as well. In Egypt, Schistosoma in the waters of the Nile, used to irrigate the fields, infects the field workers, and schistosomiasis produces enlargement of the liver from secondary hepatitis and cirrhosis with associated splenomegaly, increase in the collateral circulation, and bleeding esophageal varices. Splenectomy is followed by improvement, but the surgical creation of splenorenal or portacaval shunts is considered too dangerous because of the high risk of the procedure due to severe hepatic dysfunction and incompetency.

The U. S. Naval Medical Research Unit No. 3 (laboratories and hospital) at Cairo has a staff of distinguished scientists who have cooperated with the Egyptian scientists in studies of endemic diseases, their treatment and control.

The fine reputation of the American University in Beirut, with its medical school and hospital, is due to its high standards and highly qualified faculty. The accomplishments of the university and its graduates are known throughout the world and regarded with admiration by the Arab peoples, for many of their leaders have had their education there.

In Athens, extensive studies on lesions of the gastrointestinal and biliary tracts and on echinococcic disease (2000 cases) have been made at the Red Cross Hospital and reported by Dr. Kourias.

The U. S. Navy Support Activity (hospital) at Naples and its staff are giving medical support to the activities of U. S. Armed Forces in the Mediterranean area, aided by civilian medical consultants from the University of Naples Medical School and Hospital.

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Irradiation and Cancer of the Thyroid. Some investigators have reported an association between low dose head and neck irradiation and subsequent cancer of the thyroid in children and adolescents; other experienced investigators have failed to find such an association. Making an analysis of current statistics, the author considers that an etiologic connection between low dose neck area irradiation and subsequent thyroid cancer is not regarded as established. (L. H. Garland, Surg Gynec Obstet, May 1961)

MISCELLANY

Treatment of Extensive Burns

A. G. Clark, Department of Surgery, University of California Medical School, San Francisco, Calif. Amer J Surg 102: 231-239, August 1961.

In 1960, a total of 13 patients with burns involving more than 20% of the body surface were admitted to the San Francisco General Hospital. Of this number, 7 patients were treated in the conventional way with blood and saline and received autografts relatively late. Six patients were treated with electrolytes alone during the initial shock phase, and 2 of the 6 patients received homografts early in the postburn period. It is interesting to note that not only were there no survivors in the group treated by the conventional method, but that the time of death tended to be earlier than in the other group.

Because of the increasing mortality in burned patients, a revision of the method of treatment of burns has been instituted on the Surgical Service at the San Francisco General Hospital. The initial treatment for burn shock consists of electrolytes without the use of colloids. Oral saline solution is initiated as soon as the patient can tolerate it, which is usually on the first day. Blood is used only during the latent period if a drop in the packed cell volume becomes evident. The prophylactic use of antibiotics has been greatly curtailed. Homografts are used as an early burn dressing.

This method of treatment is compared to the results obtained in the treatment of burns in which the Brooke formula, late autografting and prophylactic antibiotics are used.

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Biopsy Diagnosis - Periarteritis Nodosa. In 30 autopsied cases of periarteritis nodosa, the kidney was most often involved; liver and gallbladder were also commonly affected. In 25 cases, glomerulonephritis was present, and in 12, there was renal periarteriolitis. Three or more different types of kidney lesions were observed in 19 cases. Renal biopsy is suggested as the direct method most likely to result in a positive pathologic diagnosis of periarteritis nodosa. The comparative difficulty encountered in making a diagnosis from a muscle biopsy and the rarity of a typical history or significant blood eosinophilia are mentioned. (V. J. Patalano and S. C. Sommers, Arch Path, July 1961)

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X-Ray Film of the Month

W. P. Bieber, Department of Radiology, University of California Medical Center, San Francisco, Calif. Dis Chest 40: 194-195, August 1961.

A 49-year old man was admitted to the hospital with complaints of productive cough, slight shortness of breath and occasional night sweats of 2 months' duration. There was no hemoptysis or history of previous respiratory illness. He had been a moderate smoker for 30 years. Physical examination was not remarkable and there was no cyanosis. Skin tests, cytology, and cultures of bronchial washings were negative. On bronchoscopy, there was a thick exudate coming from the superior segment of the left lower lobe. The chest film revealed poorly defined consolidation of the superior segment of the left lower lobe.

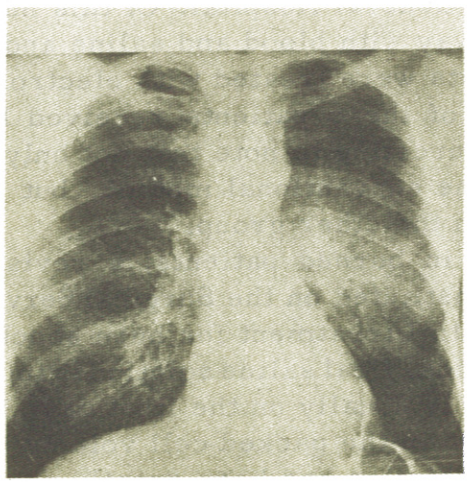

FIGURE 1a: Postero-anterior chest film

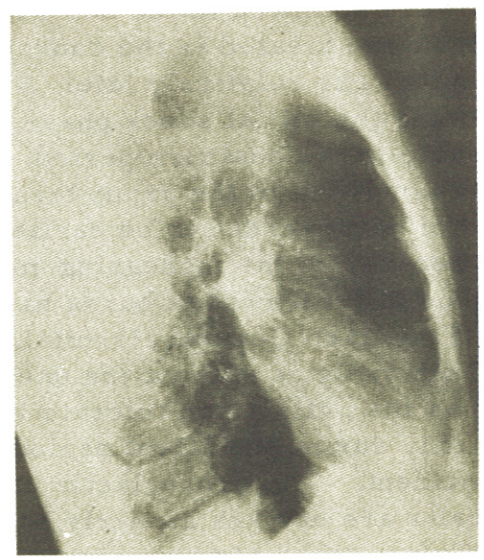

FIGURE 1b: Left lateral chest film.

Left pneumonectomy was performed. Examination of the specimen demonstrated consolidation and yellow pus in the superior segment of the left lower lobe with surrounding pleural adhesions. The surgeon felt that the lesion closely resembled that of carcinoma. Microscopically, there was marked fibrosis with acute and chronic inflammation. Lipid-filled histiocytes were present in the alveolar spaces. The diagnosis was organizing lipoid pneumonia. Further questioning of the patient disclosed that for many years he had instilled a mentholated petroleum preparation into his nostrils before going to bed.

There are no roentgenographic findings which are diagnostic of lipoid pneumonia. Two general appearances are described, the diffuse and the nodular. The former is more common and consists of widespread, ill-defined linear densities which have a "spun glass" appearance. The latter, illustrated

illustrated by this case, may be well circumscribed or poorly delineated with extension of fine projections into the adjacent tissue. The disease has a predilection for the posterior segments of both lower lobes, more predominantly on the right. The lesion may closely resemble tumor, both grossly and roentgenographically. In one series of 35 consecutive cases, 9 were operated for suspected tumor. The microscopic appearance is usually diagnostic. A high index of suspicion is the best asset in making the diagnosis.

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Staphylococcal Infections in Hospitals

A. J. Nahmias, Comm Dis Center PHS DHEW, Atlanta, Ga., and T. C. Eickhoff, Boston City Hospital. New Engl J Med 265: 177-182, July 27 1961.

Recent developments in the laboratory and epidemiologic aspects of the problem of staphylococcal crossinfection in hospitals are discussed. It would be well at this time to observe particularly where the several control measures directed against the organism itself, the person with a lesion, the carrier, air, contaminated objects in the environment and the susceptible host in the hospital, all fit into the epidemiologic cycle of hospital crossinfection. This will also demonstrate the difficulty in assessing any one specific control measure since there are so many possible pathways of spread. It becomes apparent that trends in investigation of the control of the problem are following two main avenues of approach:

Epidemiologic Control. This approach will gain momentum as more insight into the complexities of the source reservoir and spread of staphylococcal infections is obtained. The limitation of this method of control is primarily the human factor, since so much depends on such practical points as the reporting of lesions among hospital personnel and patients, the detection and management of the disseminating human carrier, the maintenance of all environmental aspects of good housekeeping and ventilation of hospitals, as well as all steps involved in good aseptic technics and isolation procedures, and the necessity of constant vigilance and continuing education of personnel.

Immunobiologic Control. As more understanding of the basic biology of the organism and the immune mechanisms operating in the host is gained, any one of several immunobiologic approaches may eventually be found to circumvent the virulence or the antibiotic resistance of the staphylococcus or to increase the host's defenses. Trends in several such directions in present-day research are discussed in this review, and offer the hope of eventual success.

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Childhood Thyroid Carcinoma

Theodore Winship and R. V. Rosvoll, Washington Hospital Center, Washington, D. C. Cancer 14: 734-743, July - August, 1961.

A total of 562 cases of childhood thyroid carcinoma were collected from all parts of the world. A definite increase in the incidence of this disease has been shown. The incidence was most marked between the years 1945 and 1957.

Almost 80% of patients questioned were found to have received irradiation during infancy or childhood for an "enlarged thymus," hypertrophied tonsils and adenoids, nevi, or angiomas. On initial physical examination, tumor was localized to the thyroid gland in only 23% of patients. In all others, metastases had occurred. Only 35% of patients were treated by surgery alone; all others were treated by either surgery and X ray, or biopsy and X ray. Twenty-three percent required secondary operations from a few months to 25 years after the original surgery.

Slides from 364 patients were sent to the authors for histologic examination. Most of the tumors were classified as pipillary carcinomas, but all known types were represented.

One hundred forty-eight patients have been followed from 10 to 34 years. It appears that the type of tumor had relatively little relationship to longevity, but that the extent of disease was the most important single factor in survival. Almost 18% of the entire group died of the disease, most of them during the first postoperative year; 24 died after having had the disease more than 10 years. Autopsies performed on 25 patients showed the cause of death, in most instances, to be carcinoma of the neck and thorax.

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Course in Ophthalmic Pathology

The Course in Ophthalmic Pathology will be given at the Armed Forces Institute of Pathology, 2 - 6 April 1962. As quotas for the course are limited, priority for enrollment will be given to Ophthalmology and Pathology residents, and to staff members in these specialties who have not yet taken their boards. Certified Ophthalmologists and Pathologists are also eligible to attend if there is sufficient space.

Eligible and interested officers should forward requests to Chief, Bureau of Medicine and Surgery, via chain of command, in accordance with BUMED INSTRUCTION 1520. 8, at least 8 weeks prior to commencement of the course. Travel and per diem orders chargeable against Bureau funds will be authorized for attendance contingent upon availability of funds.

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1962 Inservice Residency Training Program

All requests for 1962 inservice residency training must be received in the Bureau of Medicine and Surgery prior to the 15th of November 1961. The Bureau's Professional Advisory Board will meet early in December to make selections for the 1962 residency training program. All applicants will be notified of their selection or nonselection by the 15th of December 1961. The types of training programs available are:

Allergy
Anesthesiology
Aviation Medicine
Cardiovascular Diseases
Dermatology
Internal Medicine
Neurology
Obstetrics and Gynecology
Ophthalmology
Orthopedic Surgery
Otolaryngology
Pathology
Pediatrics
Plastic Surgery
Psychiatry
Pulmonary Diseases
Radiology
Surgery
Thoracic Surgery
Urology

Applications for career Medical officers qualified to enter these programs should be made by official letter to Chief, Bureau of Medicine and Surgery, via Chain of Command, in accordance with BUMED INSTRUCTION 1520.10B.

(ProfDiv, BuMed)

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American Board of Obstetrics and Gynecology

Office of the Secretary

Robert L. Faulkner MD
2105 Adelbert Road
Cleveland 6, Ohio

The next scheduled examination (Part I), written, will be held in various cities of the United States, Canada, and military centers outside the Continental United States on 5 January 1962.

Case Reports are no longer required by this Board to complete the Part I Examination.

In lieu thereof, all applicants and candidates for examination are required to submit a DUPLICATE CERTIFIED TYPEWRITTEN LIST of patients dismissed from each hospital during the preceding 12 months. This applies to new applicants, reopened candidates, and candidates requesting reexamination in Part I or Part II Examination.

Lists of Obstetrical and Gynecological patients are to be made separately and must conform in all details to the sample format furnished upon request by the office of the Executive Secretary and Treasurer.

Candidates are no longer required to bring a duplicate list of admissions to the Part II Examination. Current Bulletins may be obtained by writing to the Secretary.

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MSC Training Program

Attention is invited to the revised tabulation of full-time courses available to Medical Service Corps officers as promulgated in BUMED INSTRUCTION 1520. 12A CH 1, of 9 August 1961. Applications for enrollment in full-time programs commencing in the first quarter of fiscal year 1963 must reach the Bureau of Medicine and Surgery by 1 February 1962. (MSC Div, BuMed)

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Screening Test for Lead Absorption. BUMED INSTRUCTION 6270. 5 of 16 Aug 1961 requires periodic physical examinations of instructors and others whose primary duty is at indoor firing ranges. The "Urinary Coproporphyrin Determination, enclosure (1) of the instruction, is also widely used as a periodic screening test for personnel in other jobs in which there are potential exposures to lead (such as painters and welders), and will be useful also for those activities not having firing ranges. (Occupational Medicine and Dispensary Division, BuMed)

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From the Note Book

Study of New Communication System for Field Ambulances. The Marine Corps Landing Force Development Center, Marine Corps Schools, Quantico, Va., is now studying a recommendation to determine the requirement for installation of two-way communication systems in field ambulances used by Fleet Marine Force units.

Still the primary vehicle for the transportation of casualties, the field ambulance has never been equipped with the modern communication equipment now available. The field ambulance is often required to evacuate patients miles over rough terrain. Yet, from the time of departure until their return, they have no direct communication with the dispatching unit.

It this recommendation is adopted, two-way radio communication in these vehicles would provide for continuous contact between the attendant and a Medical officer; would permit diversion of patients to facilities not overloaded; would permit quicker replacement of a disabled ambulance; or dispatching an ambulance from one area to another without returning to the dispatching unit. (BuMed News, 13 September 1961)

NOTE: The results of these studies will be observed with great interest and reported in the Medical News Letter when available for publication. — Editor

Federal Hospital Construction Criteria. The Bureau of Medicine and Surgery, along with other federal agencies, has been working with the Bureau of the Budget in the development of design criteria for construction of Federal hospitals. The criteria are being prepared on eight functional areas, comprising about 80% of a general hospital. These activities are studied in conjunction with the commanding officers of various naval hospitals.

The first area, dining room space, has advanced to the point of general agreement and will be utilized in future construction and alterations in naval hospitals. Copies are available in the Bureau upon request. (BuMed News, 13 September 1961)

Ejection Seat Cartridges. Some stations equipped with ejection seat trainers are probably under the misconception that cartridges will be delivered on a continuing basis. Such deliveries are not scheduled. Based on the training load, each station must establish a low supply limit and order shells as required when this limit is reached. (AvMedDiv, BuMed)

Levels of Consciousness. The cerebral cortex and deep-lying structures extending down into the brain stem work together in the maintenance of the wakeful state. Depression of consciousness, of which coma is the ultimate stage short of death, can result from various kinds of structural, metabolic, and toxic damage to these vital systems. Cerebrovascular accidents (strokes), head injury, and drug poisoning predominate among the causes of unexpected unconsciousness. Care of the comatose patient starts with close attention to the respiratory, circulatory, and metabolic activities immediately essential to survival, even before the full explanation for his plight is uncovered and specific treatment begun. The principal useful tools are: the intravenous infusion set, nasogastric tube, catheter, sphygmomanometer, suction apparatus, endotracheal tube, tracheostomy set, oxygen tank, and mechanical respirator. If coma persists, a detailed program of daily care is essential, both to accelerate recovery and to minimize the complications arising in the unconscious state. (E. C. Kunkle, Disease-a-Month, August 1961)

Hepatic Blood Vessels in Cirrhosis of Liver. By corrosion cast technic, volumetric changes in the hepatic vasculature of 8 normal and 8 cirrhotic livers with ascites were recorded. The normal liver presents a uniform, intricate and reproducible vascular pattern, while the cirrhotic liver with ascites exhibits marked distortion and disruption of all components of the hepatic vasculature. There is significant decrease in the total hepatic vasculature in liver cirrhosis with ascites due primarily to marked decrease in hepatic venous outflow tract. In this study, the hepatic venous system was reduced by an average of 51% in livers of patients with advanced cirrhosis and ascites. Decrease in the hepatic venous outflow tract with secondary hepatic congestion is the probable cause of the complication of ascites which often accompanies cirrhosis of the liver with portal hypertension. (J. H. Carter, et al, Surg Gynec Obstet, August 1961)

RESERVE SECTION

Navy Ensign Medical Program

After passage of the Selective Service Act of 1940, many medical students who were obligated for military service by the Act, indicated their desire to affiliate with the Naval Reserve in order to assure that their period of active duty would be with the Navy's Medical Department. To make this possible and to provide deferment from active duty until graduation, the Ensign, Probationary (Medical) Program was established before the onset of World War II. The first appointments late in 1941 were limited to third and fourth year medical students attending class "A" medical schools. Within a few months, however, the program was expanded to include first and second year medical students, and it has since come to be known as the "Ensign, 1915 Program."

The number "1915" is a designator used to identify officers within the Department of the Navy by a code system. The first three digits—191 indicate that the officer is under instruction in a civilian school; the last digit—5 indicates an officer of the Naval Reserve. Thus, 1915 refers to an officer of the Naval Reserve with the rank of Ensign under instruction in an accredited medical school.

The primary objectives of this program are to provide (1) an opportunity for qualified medical students to affiliate with the Naval Reserve as commissioned officers while still in medical school; (2) assurance that these officers will be able to complete their medical studies and internship prior to fulfilling their obligation for active military duty; (3) assurance that when they do enter service it will be with the Navy's Medical Department; and (4) a primary source of qualified candidates for the Naval Intern Program and for the Medical Corps of the Navy and Naval Reserve.

Advantages and Opportunities

1. Those who meet the professional, educational, and physical requirements pertaining to this program are eligible and may be appointed to commissioned status as Ensign, 1915 U. S. Naval Reserve, for inactive duty while completing their medical studies. The Ensign 1915 officers are Naval Reserve officers on inactive duty in the fullest sense and are entitled to all the privileges commensurate with their rank and classification.

2. An Ensign 1915 USNR is legally deferred from military service in accordance with the provisions of the Universal Military Training and Service Act, as amended, as long as he remains in good standing in medical school, or until graduation and completion of no more than twelve months internship.

3. His period of active duty required by Selective Service legislation, is performed as a medical officer with the U. S. Navy, which is presumed to be the service of his choice.

4. He may perform his period of obligated active duty, if any, immediately upon completion of internship instead of being subject to induction by the Selective Service System at a later date. If he does not participate in the Senior Medical Student Program he is eligible for consideration for deferment upon individual request, to pursue postgraduate training, immediately upon completion of internship under the terms of the Armed Forces Physicians' Appointment and Residency Consideration Program (Berry Plan) administered by the Department of Defense.

5. He may associate with non-pay drilling units of the Naval Reserve while on inactive duty. In this manner, he gains valuable and worthwhile orientation and indoctrination into the Naval service before entering on extended active duty. Moreover, he accrues promotion and retirement point credits.

6. In the event a Naval internship is desired, he is given preferential consideration by the Department of the Navy in the selection of applicants for the Naval Intern Program.

7. He has the opportunity to compete for a Naval Research Clerkship or a Naval Clinical Clerkship.

8. Upon acceptance for enrollment in the junior year of medical school, he is eligible to apply for the Navy's Senior Medical Student Program.

Research Clerkships

Established as an active duty for training program at Naval research activities, these clerkships provide orientation and indoctrination into medical research as well as on-the-job training for the undergraduate medical student during his vacation from medical school.

Research Clerkships are of 30 to 60 days in duration and provide the full pay and allowances authorized for these officers while serving on active duty. This program begins shortly after 1 July each year and classes are convened within authorized quotas. Clerkships on an individual basis may be effected at any time during the balance of the fiscal year in order not to deny training to those officers enrolled in medical schools which use the quarter system.

Research Clerkships offer a detailed review of the specific research program being conducted at the training activity. A part of the training will be spent in each research department. Finally, the trainee will serve as an assistant in actual laboratory research on one specific project underway at that time. Selection of the project to which assigned is to be determined by mutual agreement between trainee and commanding officer after overall review of the facility program has been made by the trainee.

Research Clerkships have been established at the Research Activities listed on the following page.

Naval Medical Research Lab.
U. S. Naval Submarine Base
New London, Conn.

Naval Radiological Defense Lab.
San Francisco, Calif.

Tissue Bank
U. S. Naval Medical School
National Naval Medical Center
Bethesda, Md.

Aviation Medical Acceleration Lab.
Naval Air Development Center
Johnsville, Pa.

Naval Medical Research Unit No. 4
U. S. Naval Training Center
Great Lakes, Ill.

Naval Experimental Diving Unit
U. S. Naval Weapons Plant
Washington, D. C.

Air Crew Equipment Laboratory
Naval Air Material Center
Philadelphia, Pa.

Naval Medical Field Research Lab.
Camp Lejeune, N. C.

Naval School of Aviation Medicine
Naval Aviation Medical Center
Naval Air Station
Pensacola, Fla.

Cardio Pulmonary Function Lab.
U. S. Naval Hospital
St. Albans, N. Y.

Clinical Investigation Center
U. S. Naval Hospital
Oakland, Calif.

Naval Medical Research Institute
National Naval Medical Center
Bethesda 14, Md.

Naval Medical Research Unit No. 1
Life Sciences Building
University of California
Berkeley 4, Calif.

Clinical Clerkships

This program provides unusually interesting and informative training for the Ensign 1915 officer during his vacation from medical school.

The Clinical Clerkships are of 30 to 60 days duration and provide the full pay and allowances authorized for these officers while serving on active duty. This program begins shortly after 1 July each year and classes are convened within authorized quotas. Clerkships on an individual basis may be effected at any time during the balance of the fiscal year in order not to deny training to those officers enrolled in medical schools which use the quarter system.

Eligible officers for Clinical Clerkships are those undergraduate Ensign 1915 officers who have completed at least the second year of medical school.

Clinical Clerkships are designed to provide indoctrination and orientation into Naval medicine, rotation through the major professional services of a Naval teaching hospital, and performance of on-the-job training duties

commensurate with the individual clinical clerk's professional attainments.

Clinical Clerkships have been established at the following teaching Naval hospitals:

Chelsea, Mass.
Newport, R. I.
Pensacola, Fla.
Great Lakes, Ill.
St. Albans, N. Y.
Philadelphia, Pa.
Camp Pendleton, Calif.
San Diego, Calif.
Bethesda, Md.
Portsmouth, Va.
Oakland, Calif.
Jacksonville, Fla.
Charleston, S. C.

Senior Medical Student Program

This program is open to qualified students enrolled at medical schools accredited by the Council on Medical Education and Hospitals of the American Medical Association. Students who have completed their second year of medical school may make application for this training at any U. S. Navy Recruiting Station. Active duty covers the period of continuous attendance at school in studies that are prescribed for the senior year as certified by the Dean. To be eligible for participation, an applicant must be an Ensign, 1915 U. S. Naval Reserve, or agree to accept such an appointment if selected. A board convened in the Bureau of Medicine and Surgery selects the candidates for participation in this program.

Physical standards of this program are the same as those established for Regular Navy staff corps officers.

Active duty orders will be mailed to selectees, via their Professor of Naval Science or District Commandant. Active duty will commence upon reporting in accordance with the instructions contained in such orders and the completion of proper endorsements.

An applicant must agree, in writing, to accept a Regular Navy commission and if a Regular Navy commission is not tendered, accept an appointment in the Naval Reserve.

Participants accepting an appointment in the Regular Navy or Naval Reserve as a result of having active service in the Senior Medical Student Program as an Ensign 1915 are obligated to serve on active duty for a period of three years. This active service will commence upon completion of not more than 12 months of a civilian or Naval internship.

A participant will receive the full pay and allowances of an Ensign while on active duty in this program. Pay and allowances are as follows:

a. Less than 2 years service and no dependents, $338.58 per month; with dependents, $355.68 per month.

b. Over 2 but less than 3 years service and no dependents, $367.28 per month; with dependents, $384.38 per month.

c. Over 3 but less than 6 years service and no dependents, $430.28; with dependents, $447.38 per month.

In addition to the pay and allowances, a participant is credited with 2 and 1/2 days of annual leave for each 30 days of active duty served.

The wearing of the Naval uniform is permitted only when authorized by appropriate Naval authority.

Timing is very important. An average of 4 months is required to completely process each application. The absolute deadline when completed applications must be forwarded to the Bureau of Naval Personnel, Navy Department, Washington, D.C., is 1 February each year. This is necessary so that sufficient time is given to the board in the Bureau of Medicine and Surgery to pass on the professional qualifications, and the board in the Bureau of Naval Personnel to pass on the overall qualifications of each applicant. Those selected are required to meet the moral, mental, and physical standards of Navy acceptance. All applicants will be notified by individual letter of their acceptance or rejection not later than the first week in May.

Application should be made at the nearest U.S. Navy Recruiting Station as early as possible upon the satisfactory completion of the sophomore year.

Qualifications

A. Sex. Men or Women.

B. Age. Men or women with no prior military service should be at least 19 and of such age that upon expected date of graduation, they will be under 33. The maximum age limit for men or women with prior active military service may be adjusted on a month-for-month basis, depending upon the number of months of active military service performed, but in no case to exceed 36 months. Applications cannot be accepted from any person who will have passed his 36th birthday when he becomes eligible for superseding appointment following graduation from medical school.

C. Educational.

1. Should be within 120 days of completion of all academic work required for enrollment in medical school.

2. Should be in attendance, or have been accepted for and be within 6 months or less of the date of the next entering class, at one of the American or certain of the Canadian medical schools accredited by the Council on Medical Education and Hospitals of the American Medical Association, including approved schools of the basic medical sciences in the United States and Canada. Applications cannot be accepted from students who will attend a medical school in a foreign country other than Canada. Appointment of students who will attend a Canadian school will depend upon the proximity of the school to a U.S. Navy Recruiting Station.

3. Must not have commenced the final year of medical school.

D. Professional. Applicants are required to establish professional fitness and aptitude for the Naval service through interviews and a review of college and employment records.

E. Physical Standards. Should be found physically qualified for appointment to commissioned status in accordance with established regulations.

Service Obligation

Each regular registrant making application for appointment as Ensign 1915, U. S. Naval Reserve, signs an agreement to accept a superseding appointment in the Medical Corps; to retain such commission in the Naval Reserve for 6 years following superseding appointment and to serve on active duty for 2 years. Students who have an obligation for active military service acquire no additional obligation by participation in the Ensign 1915 Program, unless they assume extra obligated service because of participation in the Senior Medical Student Program.

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DENTAL SECTION

Periapical Repair by Dense Fibrous Connective Tissue

LCDR E. C. Penick DC USN, Naval Dental School, National Naval Medical Center, Bethesda, Md. Oral Surg 14:238-242, February, 1961.

The chief criterion for success in conservative root canal therapy performed on a tooth with a roentgenolucent area in the periapical region is complete bone regeneration of the region with re-establishment of the lamina dura and periodontal membrane. Following placement of the root canal filling, therefore, periodic checkup roentgenograms should be taken to ascertain whether periapical healing is taking place. Such healing usually occurs, provided the periapical area is not cystic and aseptic technique is followed, and each canal is sterile and hermetically sealed. The time required for complete bone repair varies with the size of the roentgenolucent area, the age and the health of the patient, and the amount of occlusal stress to which the tooth is subjected. In most instances there is some evidence of bone repair within a few months following conservative root canal treatment and considerable evidence of regeneration within one year. If, after a reasonable period of time (6 months to a year, depending upon the circumstances) a periapical roentgenolucent

area shows no roentgenographic evidence of repair, periapical curettage is indicated, provided it can be carried out without injuring other structures.

In 10 instances periapical curettage was performed on teeth that had yielded 2 negative cultures and were well filled apically and laterally, but showed no evidence of bone regeneration after a minumum of 6 months. The periapical tissue removed during curettage was submitted for histologic study. Microscopic examination of the tissue showed 4 of the 10 roentgenolucent areas to be radicular cysts, 3 to be granulomas, and the remaining 3 to be dense fibrous connective tissue (scar tissue).

The case presented here is typical of the cases that healed by the formation of dense fibrous connective tissue. The minimum interval of time between obturation of the canal and curettage of the roentgenolucent area was 10 months for the periapical areas that had healed by fibrous tissue formation.

The root canal was treated in 3 sessions. The original culture taken at the first session was positive. The canal was enlarged and cultures were obtained at both the second and the third sessions. These cultures were negative. At a fourth session the root canal was filled with gutta-percha and pulp-canal sealer.

The tooth was completely asymptomatic following placement of the root canal filling. Follow-up roentgenograms showed no regeneration of bone in the periapical region, but the roentgenolucent area did not increase in size. After 14 months it was decided that a periapical curettage should be performed. A semilunar incision was made, and a mucoperiosteal flap was reflected in the usual manner. When the periosteum was reflected, it became apparent that the periosteum and the cortical plate overlying the periapical area had been destroyed and the periapical tissue had become firmly attached to the overlying mucosa. This necessitated dissection of the periapical tissue from the mucosa. The periapical tissue was removed in toto and fixed in a 10% solution of formalin. Histologic examination of the specimen showed it to be composed of dense, relatively avascular, fibrous connective tissue which showed no evidence of any inflammatory reaction.

In the reparative phase of inflammation, the body attempts to restore injured or lost tissue with tissue of the same type. The more highly specialized the tissue, the more difficult it is to restore; in some instances a defect may be repaired with a less highly specialized tissue. This explains why any bone defect may be repaired with dense fibrous connective tissue. Leriche and Policard mention healing with dense fibrous connective tissue as a possibility in bone lesions. Grossman also mentions healing by fibrous tissue formation following endodontic treatment of pulpless teeth with periapical lesions, and Kukidome has demonstrated this type of periapical healing.

In the case presented here, the periapical lesion had been completely replaced by healthy dense fibrous connective tissue. This tissue was free from inflammatory cells and could not possibly serve as a focus of infection or deplete the defense potential of the body. Therefore, periapical curettage was unnecessary. The three lesions that healed by formation of scar tissue had certain similarities: all had sinus tracts at the time root canal treatment

was initiated, and all were diagnosed clinically as chronic alveolar abscesses. These lesions were thought to have existed for long periods of time prior to endodontic treatment of the associated pulpless teeth. The initial cultures from the root canals of these teeth were positive, and the overlying periosteum and cortical plate of bone had been destroyed in each instance. It would appear that in these cases destruction of the overlying cortical plate of bone and periosteum must have occurred prior to endodontic treatment of the associated tooth to permit an ingrowth of fibrous tissue from the overlying mucosa during the healing process.

Although data derived from 10 cases cannot be considered statistically significant, it is quite possible that periapical healing by formation of scar tissue occurs more frequently than we suspect. The periapical area remains roentgenolucent in such cases, and it is not known how this condition may be distinguished from an asymptomatic unhealed periapical lesion.

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Temporomandibular Joint Dysfunction and Facial Pain

Nicolas G. Georgiade, Duke University Medical Center, Durham, N. C. J N Carolina D Soc 44:110-115, January 1961 and Dental Abstracts, July 1961.

Temporomandibular joint pain and associated facial pain may be due to a multiplicity of factors including dental, traumatic, psychosomatic, neurologic, and pathologic causes.

Pain of dental origin may be caused by loss of the permanent posterior teeth, with loss of posterior vertical dimension which results in a shift in the bite. Overclosure of the mandible exerts greater pressure on the posterior portion of the capsule of the temporomandibular joint where the greatest region of vascularity and innervation is located. Unsatisfactory prosthetic appliances, bridges, or restorations may derange the condylar positioning.

Traumatic pain may be caused by excessive opening of the bite when yawning, by a blow to the mandible, by biting on a hard substance, or by excessive strain or mouth opening during tooth extraction.

Treatment of pain of dental or traumatic origin should include: (1) restoration of normal occlusal relation; (2) application of dry heat 2 or 3 times daily to the affected joint region; (3) limitation of joint motion by placing the patient on a soft diet, and splinting the teeth; (4) intra-articular injection of hydrocortisone acetate, 0.5 cc in the acute phase; and (5) meniscectomy, if all other types of therapy have failed.

Psychosomatic pain is one of the most important components in all types of pain in this region, and is magnified and perpetuated as long as the patient is maintained in a state of tension. Bruxism may be so persistent as eventually to restrict mandibular movements. Injection of lidocaine hydrochloride into the painful muscle during spasm, and fitting of a prosthetic

appliance to be worn at night to prevent contact of the opposing occlusal surfaces will help, provided the patient's general state of tension is also being treated.

The patient whose temporomandibular joint pain is caused by trigeminal neuralgia probably should be treated initially with alcohol block of the peripheral nerve.

Tumors or cysts of the mandible cause both direct and referred pain.

Most patients with temporomandibular joint pain are tense, nervous persons who also have some dental or occlusal disharmony.

A meniscectomy is indicated when there is repeated dislocation of the meniscus with blocking of the condyle, preventing anterior movement.

Sedation or use of tranquilizers in conjunction with the afore-mentioned therapeutic procedures will yield the greatest number of satisfactory results.

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Noise Levels of Higher Speed Dental Equipment

Noise levels and octave band analyses were made of higher speed air turbine drills at the U. S. Naval Dental Clinic, Brooklyn, N. Y. The range of overall sound levels was 85-93 db. BuMed Instruction 6260. 6A recommends that a hearing conservation program be instituted when the sound pressure level reaches 85 db in specified octave bands, and that this program should be mandatory where the noise sound pressure level reaches 95 db. This criterion applies to continuous noise exposure for a lifetime. The damage risk criterion can be applied to high speed drills by taking into consideration the daily time exposure factor. Frequency analyses reveal that the highest noise levels are in the octave bands 2400-4800 and/or 4800-9600 cps. The following table indicates the maximum permissible daily exposure time for different noise levels in these frequencies.

Daily time Exposure Minutes	Decibel Level Permissible for Frequencies 1200-2400 and 4800-9600 cps
480	85
240	88
150	90
50	95
15	100

Although noise measurements were made at 6 and 12 inches from the high speed drills, the usual working distance of the drill from the dentist's ear is

at or slightly more than 12 inches. Analysis of the data for 12 inch distance indicates that repeated daily exposure of less than 150 minutes to the high speed drill would be within the permissible limits and should not constitute a hazard to hearing. (BUMED Occupational Health Hazard; Release No. 24)

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Personnel and Professional Notes

Reserve Symposium in Conjunction with ADA Meeting. A recent Department of Defense Instruction makes it explicit that any symposium or meeting for which retirement points are accredited in conjunction with scientific or trade societies, must be produced and sponsored by a military organization. This precludes using parts of the American Dental Association's scientific session for a military program, and it has become necessary for the Dental Division to program its own creditable sessions.

The following program has been arranged for the 1961 meeting of the American Dental Association to be held in Philadelphia, Pa.

Monday Evening 16 October 1961, 1700 to 1900

Dinner meeting at the Officers' Club, Philadelphia Naval Shipyard. Speakers will be RADM C. W. Schantz DC USN, Chief, Dental Division, Bureau of Medicine and Surgery; RADM E. G. Pollard DC USN, Director of Dental Activities, 5th Naval District; and CAPT R. S. Snyder Jr, DC USN, Assistant Chief of the Dental Division, Bureau of Medicine and Surgery. Tickets for the dinner are $3.00 and can be purchased in advance by mail from CAPT W. J. Stoddard DC USNR, U. S. Naval Base, Philadelphia, Pa. Other refreshments will be available, pay as you go. Advance reservations are desirable.

Tuesday Evening 17 October 1961, 1700 to 1900

CAPT C. A. McAree USNR, Assistant for Legislation and Reserve Information, Office of the Chief of Naval Operations, will speak at the U. S. Naval Hospital Auditorium. CAPT McAree is an exceptionally fine speaker, and is highly qualified to instruct at this session.

Wednesday Evening 18 October 1961, 1700 to 1900

CAPT W. T. Sutherland USN, Executive Assistant to the Special Assistant to the Chief of Naval Personnel for Leadership, will be in charge of this session to be held at the U. S. Naval Hospital Auditorium. CAPT Sutherland is a dynamic speaker and an eminent authority on leadership.

Bus schedules will be arranged to take officers from their hotels to the meetings and return. For those driving their own cars, both the Naval Shipyard and the Naval Hospital are easily reached by a 15 minute drive south on Broad Street. The hours of the meetings have been chosen to produce as

little conflict as possible with activities of the ADA meetings and to make it convenient for all reservists, delegates, et al, to attend.

All officers of the 3 services, reserve and regular, are welcome and invited to attend any or all of the sessions.

If you are aboard by Saturday, 14 October 1961, at 9:00 a.m. do not miss the Conference on Civil Defense in the Penn East Room, Sheraton Hotel. Retirement points cannot be granted for attendance, but it will be a timely, interesting and important meeting.

Dr. Aitchison Lectures at Naval Dental School. Dr. James Aitchison of Glasgow, Scotland, lectured on Early Clinical Recognition of Osteodystrophies to staff, resident, and postgraduate Dental officers, and civilian and military guests, at the U. S. Naval Dental School, Bethesda, Md. on Friday, 8 September 1961.

Dr. Aitchison is Director of the Dental Hospital at Glasgow, Councillor of the Western Regional Hospital Board and is on the Council of the British Dental Hospitals Association. He is Dean of Glasgow University Dental School, Professor of Dental Surgery at Glasgow University and Examiner and Postgraduate Lecturer at the Royal College of Surgeons in Edinburgh.

Dr. Aitchison has served in the British Navy, Army, and Air Force. He has held many important offices and teaching posts in the past. Among them has been the post of Surgeon in Charge of Maxillofacial Unit, Whipps Cross, London. He is a past member of Dental Manpower Committee for Great Britain and has been a Nominator for the Nobel Prize in Physiology.

CAPT Niiranen Appears Before Australian Dental Congress. Acting on a request forwarded from the President of the Australian Dental Congress to the American Consul General in Australia, the Surgeon General of the Navy with the concurrence of the Commanding General, FMF, Pacific, authorized CAPT V. J. Niiranen DC USN, Force Dental Officer, FMF, Pacific, to appear before the 16th Annual Dental Congress held 14-18 August 1961 in Sidney, Australia.

CAPT Niiranen presented a symposium entitled Mass Casualty Care in the Thermonuclear Age. During his presentation he utilized the U. S. Naval Dental Corps' manikin, Mr. Disaster.

Approximately 2000 persons including visitors from the United Kingdom, Japan, Singapore, India, Philippines and New Zealand attended the Congress.

CAPT Niiranen traveled to and from Australia utilizing space available transportation at no cost to the Government.

CAPT Bonnette Presents Lecture. CAPT G. H. Bonnette DC USN, Diplomate, American Board of Oral Surgery, Chief of Dental Service, U. S. Naval Hospital, Portsmouth, Va., presented an illustrated lecture entitled Management of Zygomatic Injuries and Deformities to the staff of DePaul Hospital, Norfolk, Va., on 21 August 1961.

OCCUPATIONAL MEDICINE

Measuring the Work Capacity of the Disabled

(Continued from Vol. 38 No. 5)

For the jobs in Class I (heavy), the physician should evaluate those physical abilities required for work entailing high expenditure of energy, ascertaining insofar as possible that muscle power, joint range of motion, body agility and flexibility, body balance, and the functional capacity of the cardiovascular, respiratory, and endocrine systems are adequate for the performance of the job.

Jobs in Class II (medium) require particular attention to visual acuity, upper extremity range of motion, manual dexterity, and the required standing, walking, or sitting endurance for the specific job.

In Class III (light) the emphasis of the examination should be on fine finger dexterity, hand-eye coordination, communication abilities (speech and writing), memory, and intellectual ability.

An impression of the emotional status of the applicant in terms of the demands of the job should also be reported. His cooperation, motivation, sociability, tolerance, and emotional stability may be important factors in determining his vocational fitness.

When it is apparent that the applicant has the qualifications to meet all demands of the job, then it is obvious that he is not handicapped for that particular occupation. If, however, there is a question as to the patient's emotional or physical ability to perform the job, the physician should try to determine whether the vocational outlook will change by advising on additional measures such as treatment (medical, surgical, psychiatric, physical rehabilitation) and/or job modification (rearrangement of working area, specially designed tools and equipment).

Work Assessment

Assessing the capacity of a handicapped person for various kinds of work is extremely valuable when dealing with the more difficult vocational goal and, where no definite goal has been arrived at, may direct the examiner toward suitable vocational objectives. This assessment may corroborate the selection of a previously advised vocational plan, or may open up entirely new vocational possibilities.

In the Work Assessment Program at the May T. Morrison Center for Rehabilitation in San Francisco, the following methods are used: The medical examination is carried out to determine the actual physical capacities, and sets up the necessary work limitations. An estimate of functional capacity is given based on diagnostic and prognostic factors. Tests of functional and daily living activities are given and recorded in detail. At this point, recommendations may be made as to treatment, prosthetic aids, and further diagnostic or functional tests.

A work history is compiled by the vocational counselor based on information obtained from the patient, former employers, school records, previous training, professional licenses, and hobbies and interests.

The socio-economic background is summarized by the Social Service Department. Information as to family history, economic level, and community resources is a part of this report.

Psychological testing is used to find out if the handicapped individual is emotionally and temperamentally suited for various kinds of work. Evaluation of intelligence, personality, interest, and aptitude, as well as a psychiatric evaluation, may be needed.

With the foregoing information available, broad areas of employment possibilities become apparent. In order to investigate these areas and narrow them down to specific occupations, the Center for Rehabilitation has developed a series of work sampling procedures to test the patient's ability in a variety of job situations. The following six major occupational areas are explored: (1) subprofessional and technical, (2) clerical (computing, recording, and public contact), (3) service (domestic and institutional), (4) mechanical and manual (skilled), (5) mechanical and manual (semiskilled), (6) elemental work (light, medium and heavy).

Work sampling is done under the supervision of registered occupational therapists specially trained in this particular field. They report on work ability, rate of production, safety of performance, work habits, personal appearance, motivation, and tolerance.

A tryout in an actual work situation may also be used to determine fitness. This might be done either at the place of employment or in the Center's sheltered workshop under close supervision—usually in a ratio of one supervisor to two or three workers. At this Center for Rehabilitation these trials in the workshop permit continuous observation of work aptitude, endurance, motivation, safety, work habits, and ability to work with others.

Once the person has completed the selected series of examinations, tests, and try-outs, a final staff conference establishes a realistic and practical vocational plan. For some persons this might mean return to full time competitive employment on a selected job; for others, part time or sheltered workshop employment might be advisable on a permanent or temporary basis. In certain cases the emphasis might be on additional education, retraining, or, perhaps, homebound work. In all cases where possible every community resource is brought into the evaluation procedure (i. e., vocational rehabilitation services, California Employment Service, insurance companies, and

others) and detailed reports on every phase are made available to the participating agency or the patient's physician.

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The Lead Problem - An Outline of Current Knowledge and Opinion

H. L. Skinner Jr, 4056 Amboy Road, Great Kills, Staten Island 8, N. Y.
J Occup Med 3:429-435, September 1961.

Lead occurs in the human body without any adverse effects. Results of many analyses indicate that the mean daily lead intake of the average North American adult is about 0.3 mg of lead in food and beverages. This same amount is eliminated daily; hence, there is an equilibrium between intake and elimination and no lead retention. The safe level of lead ingestion in food and drink appears to lie between 0.3 mg and 0.6 mg per day.

Lead may also be inhaled from the air, reach the lungs, and be absorbed into the blood stream. This is supplemented by the lead which is retained in the upper respiratory tract, removed by the action of the cilia, and swallowed. An important factor in regard to air concentration is particle size. Since approximately 90% of swallowed lead is excreted unabsorbed, a large portion of the lead which enters the respiratory tract may not be absorbed if the particle size is large, and the air concentration which is determined in terms of weight may exaggerate the exposure conditions. On the other hand, if all particles are present as finely divided fume, the effect may be somewhat underestimated.

Air Analysis

Purpose and Use. Air analyses are specific measurements of the environment and permit evaluation of a hazard where workers are exposed. They also help in determining sources of dissemination and, thus, point to places where control is needed and at the same time serve as a basis for selecting the most desirable type of control. Air analyses can be used to check the effectiveness of engineering control measures. Hygienic standards for air concentrations are based on laboratory research using animals and field studies, correlating the medical observations of exposed persons with data on the concentrations of contaminants to which they are exposed. The better the correlation between air concentration and effects, the greater the reliability of the standard.

Safe Atmospheric Concentration. Recently, the Hygienic Guides Committee of the American Industrial Hygiene Association adopted a standard of 0.2 mg of lead per cubic meter of air as the upper limit of safety for the concentration of lead dust or fumes.

Quantitative Biologic Studies

Urinary Lead Excretion. Normals—Normal urinary lead excretion varies from about 0.01 mg to 0.08 mg per liter; the mean value is about 0.03 mg per liter. Values of 0.15 mg to 0.20 mg per liter have generally been used as an upper safe limit for urinary lead excretion. Concentrations considerably in excess of these levels, however, have been found without any evidence of lead poisoning and, conversely, evidence of poisoning has been present with concentrations of less than 0.15 mg per liter. The higher the level above the normal range, nevertheless, the greater the likelihood that poisoning will occur. The diagnosis cannot be made from urinary lead levels alone; these must be used in conjunction with other data and clinical findings.

Correlation with Air Concentration—Urine analyses may show a low level of absorption even though air concentrations are high because of the large particle size or insolubility of the lead compound involved. On the contrary, air analyses may be low, well within acceptable limits, and urine values high. In one instance, it was found that the exposure was from a source outside the plant.

Sliding Scale—For practical purposes, values below 0.1 mg of lead per liter of urine may be considered of no significance; values between 0.1 mg and 0.2 mg constitute an intermediate zone, and values above 0.2 mg per liter are evidence of hazardous exposure.

Blood Lead Concentration. Normals and Sliding Scale—Blood lead concentration also gives an index of lead absorption, helping in cases of nonspecific symptomatology. There is no specific level of blood lead which can be interpreted as indicating that lead poisoning exists. Blood concentrations of 0.01% mg to 0.06% mg are considered within the normal range for persons with no industrial exposure to lead. Values between 0.06% mg and 0.08% mg may be considered as transitional, and values above 0.08% mg are indicative of unsafe exposure.

Correlation with Urine Levels—The urinary lead and blood lead values should correlate closely. Should they not, the blood level is probably erroneous. There is neither evidence nor reason for believing that there is any kind of susceptibility to lead which results in intoxication, when the level of lead concentration in the blood is lower than a certain threshold level, 0.08% mg.

Use of Standards. Standards must be recognized for what they are, the concensus of a group exercising its best judgment. Using the figures given above, there is validity in evaluating exposure and absorption of lead, but there is no need to place undue significance on one specific figure. Safety standards cannot be used per se to make a diagnosis, nor can they determine the question of causal relation. Diagnosis in an individual case is a conclusion on the basis of medical findings to which information of the occupational exposure makes an indispensable contribution.

Metabolism of Lead

Lead Distribution in Tissues. Everyone eats, drinks, and inhales a

variable quantity of lead daily. A portion of the lead inhaled is absorbed from the lungs into the blood. The remainder is swallowed, and 10% or less of the swallowed lead is absorbed. Only certain organic lead compounds (e.g., tetraethyl lead) can be absorbed by contact with the skin.

The absorbed lead is distributed to the tissues of the body generally, including the liver, from which it is partially excreted back into the alimentary tract with the bile. Some lead is excreted in the urine. The remaining lead is then deposited in accordance with a definite pattern; the long bones of the skeleton accumulate the major portion.

Increased Exposure. When there is an increase in the lead exposure of a person above his usual or normal level, a number of things occur promptly. There is an immediate rise in the alimentary lead content as revealed in the feces. This rise bears direct relation to the quantity ingested or inhaled as most such lead passes through the alimentary tract unabsorbed. But some absorption does take place from both the lungs and the alimentary tract, and the concentration of lead in the blood, the tissues, and the urine gradually increases. This increase varies according to the size of the daily dose, that is, the intensity and the constancy (or intermittency) of the prevailing exposure. Paradoxically, fecal lead analyses are not of much help clinically, for the much larger quantity of unabsorbed lead that has been ingested with food masks that which has been taken in via increased exposure unless such exposure has been overwhelming.

Removal from Exposure. After discontinuance of lead exposure, the lead retained in the body during the period of increased absorption maintains the lead concentration of the tissues, the blood, and the urine above normal levels for a period of time that depends upon both the quantity of lead retained and the time over which it was absorbed. Thus, the concentration of lead in the blood and urine decreases progressively, reaching a normal range in a period of from a few weeks to considerably more than a year. The alimentary tract, however, is emptied of its abnormal lead content to a large extent within a few days after discontinuance of exposure. The lead content of the tissues of the body diminishes in accordance with the rate of elevated lead excretion, there being some lag but by no means immobility in this regard on the part of the skeleton. Available analytical data show that approximately normal lead concentrations in the tissues are commonly reached within 12 to 18 months, the skeleton being the last to return to the normal range.

Toxicity. The above facts demonstrate clearly that lead occurs in the human body without prejudice to normal health and that a toxic effect on the part of the element is a matter of concentration. They also demonstrate that the absorption and excretion of quantities of lead considerably in excess of the usual and normal levels are wholly compatible with normal and healthy human life and activity and that lead intoxication is not to be expected if certain limits of exposure and absorption are not exceeded.

Qualitative Tests

Porphyrins—Tests for coproporphyrin in the urine may be markedly

positive as a result of toxicants other than lead, such as alcohol and barbiturates. But, in the known lead worker, its finding in a frank 4 plus is most likely to indicate lead absorption, particularly if liver profile studies are within normal limits. Several clinical workers have noted that qualitative porphyrin tests become positive before stipple cells appear. Observations have shown that lead interferes with hemoglobin synthesis, with iron utilization, and with erythrogenesis in the bone marrow. Studies have also shown that the defective red cells so produced are preferentially removed by the spleen and probably the reticuloendothelial system as well. This interference in hemoglobin metabolism and red cell maturation is reflected in positive urinary porphyrins, the appearance of stippled red cells, and the development of anemia. However, no well-defined correlation of these factors has been established.

Advantages of Qualitative Tests. The real advantages of qualitative tests lie in that they are practical, fast, and little subject to error. They can be done without fear of lead contamination and do not take the men from work for long periods. Used serially and in conjunction with clinical examination and evaluation, they are effective in estimating levels of lead absorption.

Treatment

Resume. Lead, once absorbed into the blood stream, is distributed throughout the entire body. It is deposited with calcium in the long bones where it remains stored in equilibrium with body fluids. In the normal course of events, the lead is excreted in the urine or intestines and a balance is achieved. As already noted, the normal person takes in 0.3 mg per day and rids himself of the same amount per day. With increased absorption, the body cannot rid itself so quickly, and the excess is deposited mainly in the bones. If this does not occur fast enough, toxic levels are reached in the blood and tissues, and symptoms of poisoning occur. If, over a period of time, lead is deposited in long bones and a period of stress occurs, increased quantities of lead may be released into the circulation and tissues again, and toxic manifestations occur. The actual amount of lead in the body is not important; the blood and tissue levels are important.

Edathamil (ethylenediamine-tetraacetic acid; EDTA) and its salts are chelating drugs. Chelation is the term applied to the process whereby a ring-like structure is formed in which a special type of bonding (coordinate) takes place between some of the atoms that form the ring. A multivalent positive ion, such as lead or calcium, when incorporated in a ring complex or chelate no longer retains its ionic properties. A sequestering agent is a compound that reacts with multivalent positive ions and retains them in an un-ionized state in a water-soluble product. Edathamil and its monosodium and disodium salts are both chelating and sequestering agents. When calcium is added, a chelate is formed; therefore, edathamil calcium disodium is the calcium chelate of the disodium salt of the acid (edathamil).

To avoid the possibility of producing hypocalcemia, edathamil calcium disodium is used. The administration of this compound results in removal of

lead from the body fluid because lead replaces calcium in the ring, yielding the more stable lead complex. Since the lead is chelated and sequestered, it cannot exert its toxic effects and is rapidly excreted, 50% within the first hour, 90% within seven hours. The primary de-leading action is apparently accomplished by removing lead from the plasma and body fluids. The lead level falls as excretion proceeds...then, subsequently, may rise again as the lead in the skeleton comes into equilibrium with the body fluids again.

Dosage. The recommended maximum dose for intravenous administration for each 10 pounds (4.5 kg) of body weight is 0.17 gm per hour, 0.33 gm per day, or 1.67 gm per week. The drug should be given in a concentration not to exceed 3%, in isotonic saline or 5% dextrose solution. Maximum dose per course of treatment is 2.5 gm for each 10 pounds of body weight. Courses should be separated by intervals of 7 days, and it is inadvisable to exceed 2 courses, until or unless analytical results show a failure of blood levels to diminish satisfactorily or to remain below dangerous concentrations. Dramatic subjective improvement has occurred in many cases shortly after institution of therapy. In other cases, however, additional time-proved methods such as administration of calcium gluconate have been necessary. The drug is most useful in the treatment of the acute phase of the illness. Its principal virtue, however, lies in its ability to expedite the elimination of potentially toxic quantities of lead from the body.

Use. The routine use of edathamil as prophylaxis against the absorption of lead cannot be condoned. Toxic reactions may occur from use of the drug itself and, while such reactions are not frequent, this must be considered in evaluating its use in a particular instance. As has always been true in the past, prophylaxis can be achieved safely only by controlling the sources of exposure to lead by the application of proper measures of industrial hygiene. Edathamil, by its action, speeds up a natural process. With no exposure or further absorption, the excess lead would, over a period of time, be excreted. The removal from lead areas in many cases would be adequate treatment and prophylaxis.

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Liver and Kidney Damage from Exposure to Carbon Tetrachloride

The three cases of carbon tetrachloride poisoning described resulted from the inhalation of carbon tetrachloride during a single work shift. They are published because the opinion that kidney and liver damage due to the poison only follows long continued exposure is still frequently expressed. The cases were in 3 women workers, 2 of whom were employed in making toys and the other in cleaning textiles. Because of the shortage of the chemicals usually employed in their work, carbon tetrachloride was used instead. Within a short time of beginning work with carbon tetrachloride the women were taken ill with giddiness, nausea, and vomiting. There are full hospital case reports with

clinical and laboratory findings. The narcotic effects of the inhalation of carbon tetrachloride were relatively moderate, but there was some evidence of severe hepatic and renal damage which necessitated a stay in the hospital for several months. Although the 3 women were greatly improved, the damage sustained has not fully healed. Points made in the conclusions are that the existing legal control of the sale and use of carbon tetrachloride is inadequate and that nowadays it is unnecessary to use this poisonous substance for cleaning purposes or for fire fighting. (Industr Hyg Dig, August 1961)

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Automobile Antismog Devices

Spelling out formal test procedures and specifications for automobiles antismog devices, the California State Motor Vehicle Pollution Control Board set limits of 275 ppm hydrocarbons and 1.5% carbon monoxide on exhaust emissions. The board also specified various driving conditions over 20-minute test periods. Now companies that plan to submit devices can test them with the same methods that the control board itself will use. Applicants that pass the first hurdle must then send 25 devices for more thorough testing. (Industr Hyg Dig, July 1961)

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